Comorbidity of Internalising and Externalising Disorders in a Clinical Sample of Children with Low IQ

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Statement of Sources

I declare that this thesis is my own original work and that, to the best of my knowledge and belief, it does not contain material from published sources without proper acknowledgement, nor does it contain material which has been accepted for the award of any other higher degree or graduate diploma in any university.

Sara Robinson .....Date 24/4/14

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract

Low IQ has been indicated to be a risk factor for the comorbidity of psychiatric disorders, although there is a paucity of research in this area. The aim of the current study was to use latent class analysis to determine groups of children with distinct combinations, or classes, of internalising and externalising disorders. The data consisted of parent interview records of 310 children and adolescents (231 boys and 79 girls), referred to the Academic Child Psychiatry Unit (ACPU) of the Royal Children's Hospital, Melbourne. Participants were aged between 4 and 18 years with an IQ between 40 and 79. All were diagnosed with at least one of the internalising or externalising disorders. The results of the analysis revealed two underlying classes. Individuals in Class 1 had high levels of comorbidity across all of the internalising and externalising disorders, whereas individuals in Class 2 had high levels of comorbidity within the externalising disorders only. The patterns of comorbidity that were revealed contribute to the comorbidity research and to the taxonomic debate, and have important implications for clinical practice.

Intellectual impairment represents a significant global burden. Individuals with intellectual impairment are more likely to experience poor physical health and quality of life, and have reduced life expectancy compared with their peers who have no intellectual impairment (Dykens, 2000). The potential outcomes are human and financial costs for individuals with intellectual impairment and their families, and significant financial cost to the health and disability services systems and the economy in general (National Health and Hospitals Reform Commission Interim Report, 2009). Compounding the problem is the increased prevalence of emotional and behavioural disorders among those with low IQ compared with the general population (Bradley, Summers, Wood, & Bryson, 2004).

To date, many studies involving children have revealed high levels of comorbidity. Comorbidity refers to the presence of two or more distinct and separate disorders within the same individual (Achenbach, 1991a; Angold, Costello, & Erkanli, 1999; Garnefski & Diekstra, 1997; Caron & Rutter, 1991). There is some evidence that individuals with low IQ (often termed 'intellectual disability' in the literature) experience substantially more comorbidity than those with normal IQ. However, there is a paucity of research on comorbidity in children and adolescents with low IQ. From here on in, the term "children" will be used to denote children and adolescents, unless differentiation is necessary.

The aim of the current study was to examine comorbidity of the 13 common childhood disorders (10 internalising disorders, and 3 externalising disorders) in a sample of clinic-referred children and adolescents. Within the context of the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*; American Psychiatric Association, 2000) the internalising disorders include the anxiety and mood disorders: major depressive disorder, dysthymia, separation anxiety disorder,

social phobia, specific phobia, panic disorder, agoraphobia, generalised anxiety disorder and posttraumatic stress disorder. The externalising disorders include attention-deficit hyperactivity disorder, conduct disorder and oppositional defiant disorder.

IQ and psychopathology

Existing data has been reported on the link between intellectual disability and psychopathology. Low IQ has been found to be a risk factor for psychopathology (Masi, 1998; Matson & Shoemaker, 2011; Verhulst, van der Ende, Ferdinand, & Kasius, 1997). The IQ cut-off score for intellectual disability is two standard deviations below the mean (i.e., an IQ of approximately 70; American Psychiatric Association, 2000). The current study utilises a cut-off point of 80. Individuals with an IQ of around 80 are considered to have borderline intellectual disability (IQ range 71 to 85), with accompanying difficulties in daily functioning (American Psychiatric Association, 2000; Fernell, 2010). Of note, previous studies exploring intellectual disability tend to be inconsistent in their use of criteria and definitions of low IQ, with cut-off scores (where they are explicitly stated) ranging from 70 to 80.

The prevalence of a wide range of psychiatric disorders has been found to be much greater in those with intellectual disability than those without intellectual disability (de Ruiter, Dekker, Verhulst, & Koot, 2007; Dykens, 2000; Emerson, 2003; Emerson & Hatton, 2007). However, prevalence estimates vary widely. Epidemiological studies of the development of psychopathology in children with intellectual impairment have reported that psychopathology is three to seven times more likely than in young people without intellectual impairment (Dekker, Koot, van der Ende, & Verhulst, 2002; Koller, Richardson, Katz, & McLaren, 1982; Linna et al., 1999; Rutter, Tizard, & Whitmore, 1970), with a range between 10% and 60%

(e.g., Koskentausta, Livanainen, & Almqvist, 2007; Strømme & Diseth, 2000), or even 70% (Göstason, 1985).

Low IQ and externalising disorders

Research studies have reported a strong relationship between low IQ and externalising disorders. More specifically, Attention-Deficit Hyperactivity Disorder (ADHD) appears to be strongly associated with children with low IQ (e.g., Hastings, Beck, Daley, & Hill, 2005; Kuntsi et al., 2004; Simonoff, Pickles, Wood, Gringras, & Chadwick, 2007). Hastings et al's. (2005), analyses of samples of children with intellectual disabilities revealed an increased prevalence of ADHD symptoms in children with intellectual disabilities compared to their non-intellectually disabled siblings. Furthermore, Simonoff et al. (2007) compared ADHD symptoms in children with low IQ with ADHD symptoms in non-intellectually disabled children. The authors reported a negative linear relationship between ADHD symptoms and IQ and concluded that ADHD symptoms are more prevalent in children with intellectual disability than those without, and that ADHD is more strongly associated with lower levels of IQ. Other researchers have also found a strong link between low IQ and externalising disorders (Borthwick-Duffy, Lane, & Widman, 1997; Dekker et al., 2002; Einfeld & Tonge, 1996b; Gillberg, Persson, Grufman, & Themner,1986; Koller et al., 1982; Molteno, Molteno, Finchilescu, & Dawes, 2001). Taken together, evidence supports a robust relationship between intellectual impairment and the presence of externalising disorders.

Low IQ and internalising disorders

There is a lack of previous research on comorbidity and low IQ within the internalising disorders in clinic-referred children. However, examination of studies

of the general population indicates some consistency in findings regarding comorbidity and prevalence of internalising disorders in non-intellectually disabled children (e.g., Costello et al., 2003; Higa-McMillan, Smith, Chorpita, & Hayashi, 2008; for a meta-analysis see Angold et al., 1999). Given that comorbidity within the internalising disorders in the general population appears to be common, it is reasonable to suggest that studies in the low IQ population will yield similar findings. Future research is clearly needed in this area.

Low IQ and multiple disorders

Given the limited data on comorbidity in children with low IQ, it is possible to make predictions in relation to comorbidity using existing epidemiological studies on individuals with low IQ and research on comorbidity in children in the general population. Regarding prevalence of disorders in children with low IQ, data in the intellectual disability literature indicates that multiple psychiatric illnesses are common. In their study of 6 to 18 year old students at Dutch schools for intellectual disability, Dekker and Koot (2003a) reported that the majority of the children had a *DSM-IV* psychiatric diagnosis, and of these, multiple diagnoses were present in 37%. This finding is comparable to data found on non-intellectually disabled children (eg. Einfeld & Tonge, 1996b; Gillberg, Persson, Grufman, & Themner 1986; Koskentausta et al., 2007; Linna et al., 1999; Reiss, 1990; Rutter, Tizard, Yule, Graham, & Whitmore , 1976; Strømme & Diseth, 2000). The highest rate of comorbidity was observed for mood disorders with a disorder in another broadband grouping, such as an externalising disorder. Dekker and Koot (2003a) commented that compared to the intellectually impaired children with only one mental health disorder, those with comorbid disorders experienced more impairment in several

areas of daily living. Overall, epidemiological studies indicate the presence of multiple psychiatric disorders is in children with low IQ.

Severity of IQ and presence of psychopathology

Given that there appears to be a strong correlation between low IQ, psychopathology and comorbidity, it is interesting to examine whether a relationship exists between severity of IQ and presence of psychopathology. There is evidence in the literature that a certain level of intelligence may be required for psychopathology to develop. Several studies suggest that the prevalence of psychopathology increases as the level of IQ decreases; in other words, individuals at the lower end of the IQ spectrum have more psychiatric diagnoses (e.g., Chadwick, Piroth, Walker, Bernard, & Taylor, 2000; Gillberg et al., 1986; Molteno et al., 2001; Oliver, Murphy, & Corbett, 1987). For example, Molteno et al. (2001) studied a sample of children with intellectual disability in Cape Town, South Africa, and found a higher prevalence of behavioural and emotional disorders in children with more severe intellectual disability. However, it is important to note that research on the association between severity of intellectual impairment and psychopathology is inconsistent, in part due to the difficulties in identifying and diagnosing clinical psychopathology in individuals at the lower end of the IQ spectrum (Hurley, 1996; Masi, Mucci, Favilla, & Poli, 1999; White, Chant, Edwards, Townsend, & Waghorn, 2005). Indeed, a few researchers have reported that psychopathology is more strongly associated with higher levels of intellectual functioning than the lower end of the IQ spectrum (Emerson, Einfeld, & Stancliffe, 2010; Koskentausta et al., 2007). However, overall, it seems as though children with more severe levels of intellectual impairment are more likely to have increased psychopathology and comorbidity.

Severity of IQ and type of psychopathology

In addition to examining the relationship between IQ and presence of psychopathology, it is also interesting to examine the relationship between IQ severity and specific types of psychopathology. There is evidence that the severity of intellectual impairment is correlated with the type of psychopathology observed and diagnosed. For example, several authors report that children with higher levels of functioning within the low IQ population are more likely to exhibit antisocial behaviours, and have anxious and depressive symptoms, whereas children within the lower IQ ranges tend to endorse self-absorbed, autistic and psychotic behaviours (Borthwick-Duffy, Lane, & Widman, 1997; Dekker et al., 2002; Einfeld & Tonge, 1996b; Gillberg et al., 1986; Koller et al., 1982) and other externalising disorders, such as ADHD (Simonoff et al., 2007). Molteno et al. (2001) found that children with profound and severe levels of intellectual disability were more likely to have communication problems and autistic behaviours compared with children with mild intellectual impairment. Taken together, these findings suggest that externalising disorders are more likely to be present in children at the lower end of the IQ spectrum.

Low IQ, psychopathology and age

The findings in the intellectual disability literature generally support the view that psychopathology in children with low IQ varies according to age. Recent longitudinal studies have demonstrated that internalising and externalising problems vary over time in children with low IQ. For example, de Ruiter et al (2007) conducted a large school-based study on psychopathology in children aged 6 to 18 years with moderate to borderline intellectual functioning. Results indicated that internalising scores increased slightly with age, whereas externalising scores

decreased significantly over time. In addition, across all ages, the overall scores for the internalising problems were lower than for the externalising problems. In a British cross-sectional prevalence study, Emerson (2003) compared the prevalence of psychopathology in children with and without low IQ, and found that depressive and other internalising symptoms were more common in older children. The few studies that have been conducted in this area provide some evidence that there is a relationship between age and psychiatric disorders, and that depressive symptoms are more likely to manifest in older children.

Comorbidity

For children in the general population, Agnold et al. (1999) proposed that studies of comorbidity tended to be either those that examine comorbidity between disorders within the same diagnostic grouping (such as obsessive compulsive disorder and major depressive disorder), or those that examine comorbidity between disorders from different diagnostic groupings (such as dysthymia and conduct disorder). Angold et al. (1999) devised the term "homotypic comorbidity" to represent the first type of studies and "heterotypic comorbidity" to represent the second type of studies.

Although existing data suggest high prevalence of a broad range of psychiatric disorders among those with low IQ, there is currently little data on comorbidity in this group. Generally, studies on psychiatric comorbidity in children with low IQ are limited in that they focus on pairs of disorders, rather than multiple disorders. Another limitation is that studies tend to focus on the issue of 'dual diagnosis', which is the diagnosis of a psychiatric disorder in the presence of low IQ (e.g., Einfeld, Ellis, & Emerson, 2011; Lehotkay, Varisco, Deriaz, Douibi, & Carminati, 2009; Reiss & Valenti-Hein, 1994).

Comorbidity in the general population

In addition to the use of epidemiological data on the prevalence of disorders in children with low IQ, it is possible to extrapolate findings from the general population to the low IQ population. Studies of the general population of children indicate that psychiatric comorbidity is common (e.g., Bird, Gould, & Staghezza, 1993; Costello Mustillo, Erkanli, Keeler, & Angold, 2003; Kovacs & Devlin, 1998; Lahey et al., 2004). In a longitudinal community study, Costello et al. (2003) examined concurrent comorbidity (the co-occurrence of two or more diagnoses at the time of measurement) in 9 to 16 year old children. High rates of comorbidity within the externalising disorders and between anxiety and depression were found, as well as a robust correlation between oppositional defiant disorder and depression. Bird et al. (1993) examined the comorbidity of pairs of disorders within four diagnostic domains: attention deficit disorders, conduct/oppositional disorders, anxiety disorders and depressive disorders. The results indicated that each of the domains of psychopathology – attentional deficits, depressive disorders and anxiety disorders – is highly comorbid with the conduct/oppositional domain and vice versa. Bird et al's (1993) study provides further evidence for heterotypic comorbidity in children.

Thus, overall, findings in the general literature indicate that comorbidity is common in children and adolescents. Given these findings, it is reasonable to suggest that children in the low IQ population will also demonstrate significant levels of psychiatric comorbidity. Clearly, this is an area worthy of research.

Methodologies for studying comorbidity

Many experts agree that useful methodologies for the study of multiple cormorbidity (comorbidity of two or more disorders) include exploratory and confirmatory factor analysis, item response theory and latent class analysis. Factor

analysis is used in comorbidity research to determine the features that are most important when classifying disorders, to generate underlying constructs, to establish the validity of factor models, to test whether a set of factors are correlated or uncorrelated and to compare the ability of two different models to account for the same set of data (deCoster, 1998). Krueger and Finger (2001) used confirmatory factor analysis and item response theory to examine the comorbidity between anxiety and depressive disorders. The researchers examined whether seven disorders (social phobia, simple phobia, agoraphobia, generalised anxiety disorder, panic disorder, major depressive episode, and dysthymia) were reflective of a single underlying latent trait, or 1-factor model. More recently, Gomez, Vance, and Gomez (2013) utilised confirmatory factor analysis to examine the factor structure of the anxiety and depressive disorders in a sample of clinic-referred adolescents. As the current study used LCA, this method is examined in more detail next.

Latent class analysis

In LCA, individuals within a class share characteristics that distinguish them from members of another class, so that individuals within a class, or group, are more similar to each other than they are when compared with members from another group. LCA assumes that the patterns of scores are determined by a latent, or unobserved, categorical variable. The number of latent classes corresponds to the number of different classes of individuals. When applied to individuals with the different internalising and externalising disorders, LCA will capture distinct classes of individuals, where each class will be defined in terms of the probability that certain disorders are present or absent. Put another way, LCA will deal with unobserved heterogeneity within the sample of children by identifying groups of individuals who share similar characteristics of psychiatric comorbidity. In sum,

LCA serves to contribute to current knowledge about, and understanding of, psychiatric comorbidity in a clinical sample if children with low IQ.

LCA studies of comorbidity in children

To date, there are no previous studies utilising latent class analysis (LCA) to examine comorbidity across internalising and externalising disorders in a sample of children with low IQ. However, LCA has been used in the normal population to examine the comorbidity of internalising disorders. Gomez and Vance (2013) used LCA to examine the comorbidity of the anxiety and mood disorders in a sample of clinic-referred adolescents. Findings showed support for a 2-class model; individuals in class 1 had higher rates of comorbidity for all the internalising disorders. Individuals in class 2 had moderate rates of comorbidity for several of the internalising disorders (dysthymia, major depressive disorder, generalised anxiety disorder, specific phobia), and lower rates of comorbidity for the remaining internalising disorders (separation anxiety disorder, social phobia, panic disorder, agoraphobia, obsessive compulsive disorder and posttraumatic stress disorder).

LCA has also been used to examine internalising dimensional syndromes. For example, Wadsworth, Hudziak, Heath and Achenbach (2001) examined comorbidity between depression and anxiety symptoms in clinic-referred and non-referred children by applying LCA to subjects' scores on problem items from the Anxious/Depressed scale of the Child Behaviour Checklist (CBCL; Achenbach, 1991b). Within the context of previous research evidence showing that symptoms of depression and anxiety co-exist at extremely high rates in both adults and children and that 'pure' instances of depression and anxiety were atypical, Wadworth et al's (2001) LCA study revealed a 3-class solution consisting of mixed anxiety and depression symptoms. Van Lang, Ferdinand, Ormel and Verhulst (2006) conducted

a similar study in which LCA was applied to self-report ratings of *DSM-IV* symptoms of anxiety and depression. Consistent with Wadsworth et al's (2001) findings, Van Lang et al. (2006) reported that only very small numbers of young adolescents (aged 10 to 12 years) had mainly depression or mainly anxiety symptoms, and that the five latent groups revealed by the analysis contained adolescents with either a low, moderate or high probability of possessing comorbid symptoms of anxiety and depression. The authors highlighted the clinical usefulness of LCA for identifying more severe problems such as suicidal thoughts experienced by adolescents from a general population sample. The LCA research outlined above validates the utility of the latent class approach, both for categorical disorders and dimensional symptoms.

In terms of function, LCA clusters a sample of individuals into smaller homogenous groups, or classes, and is one of the most effective methods for capturing, or revealing, distinct, homogenous groups within a heterogeneous population (Hagenaars & McCutcheon, 2002; Hudziak, Wadsworth, Heath, & Achenbach, 1999; Lubke & Muthén, 2005; McCutcheon, 1987; Van Lang et al., 2006; Wadsworth et al, 2001). Although the population of individuals with intellectual impairment is heterogeneous, in that it comprises a wide range of observable and different aetiologies, characteristics, psychopathologies and treatment responses, it is possible that some discrete homogenous subgroups, or latent classes, will be present. LCA assumes a latent variable exists that determines the individual levels of the indicators or variables, for example, psychiatric disorders. Thus, in terms of the current study, LCA assumes that there is a latent variable that determines whether children with low IQ suffer from one or more psychiatric disorders.

Aim of the current study

Given the global burden of intellectual impairment and the current limited understanding of the nature of diagnostic comorbidity in children with low IQ, the key aim of the current study was to use LCA to determine groups of children with distinct combinations, or classes, of internalising and externalising disorders. The study of comorbidity is important and relevant, since the presence of co-occurring disorders in an individual has critical implications for the severity of impairment, the types of treatment interventions used, the responses of the individual and the success of treatment (McConaughy & Achenbach, 1994). The 13 disorders that served as indicators in the LCA were separation anxiety disorder (SAD), social phobia (SOP), specific phobia (SPP), panic disorder (PD), agoraphobia (AGOR), generalized anxiety disorder (GAD), obsessive compulsive disorder (OCD), posttraumatic stress disorder (PTSD), dysthymic disorder (DYTH), major depressive disorder (MDD), attention-deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD) and conduct disorder (CD). The internalising disorders were SAD, SOP, SPP, PD, AGOR, GAD, OCD, PTSD, DYTH and MDD. The externalising disorders were ADHD, ODD and CD.

Hypotheses of the current study

As the literature generally supports the view that children with low IQ have a wide range of anxiety, mood and behavioural disorders, and that multiple diagnoses are common, it is hypothesised that the LCA will identify a class with high probabilities of all the internalising and externalising disorders. Secondly, given that previous research has found that children with low IQ are likely to have a diagnosis of an externalising disorder, it is hypothesised that LCA will identify a class with relatively higher probabilities for the externalising disorders compared to the

internalising disorders. Thirdly, since several epidemiological studies indicate that children in the low IQ population who are at the lower end of the intellectual functioning spectrum are more likely to have psychopathology than those at the higher end of the spectrum, it is hypothesised that individuals with higher levels of comorbidity will have a significantly lower IQ than individuals with lower rates of comorbidity. In other words, should the LCA reveal a high comorbidity class of children and a low comorbidity class of children, it is expected that the overall IQ of the high comorbidity class will be lower than the low comorbidity class. A t-test will ascertain whether there is a significant difference in IQ between high and low comorbidity classes.

Method

Participants

The data for all participants were collected archivally from the Academic Child Psychiatry Unit (ACPU) of the Royal Children's Hospital, Melbourne, Australia. The ACPU is an out-patient psychiatric unit that provides services for children with emotional, behavioural, and learning problems.

Parent interview records of 310 children (231 boys and 79 girls) aged between 4 and 18 years inclusive (mean age = 11.13 years; SD = 3.13) and with an IQ between 40 and 79 inclusive (mean IQ = 69.53; SD = 8.69) were used in the current study. Sixteen participants had an IQ between 40 and 50, twenty-eight participants had an IQ between 51 and 60, eighty participants had an IQ between 61 and 70, and one hundred and eighty-six participants had an IQ between 71 and 79. The participants were referred between 2004 and 2010. The majority of referrals were from other social and welfare organizations, schools and medical services. All

of the participants were diagnosed with at least one of the internalising or externalising disorders.

Descriptive information

More than two-thirds of participants had mothers and fathers who had attended at least secondary school, and were from families with an income less than $50,000 per year. Most mothers were mainly employed or involved in home duties and most fathers were employed. As regards parental relationship, approximately half were living together, and 40% were separated or divorced.

Frequencies of the disorders

Table 1 provides the frequencies and percentages of different disorders for the participants. All diagnoses were made using the Anxiety Disorders Interview Schedule for Children (ADISC-IV; Silverman & Albano, 1996). As shown in the table, GAD, DYSTH and SPP were more prevalent than the other internalising disorders. SOP, OCD and SAD were also relatively high. MDD and PTSD were relatively low, and PD and AGOR were very low. ADHD was the most prevalent disorder out of all of the disorders, followed by ODD. CD was lower than ADHD and ODD, but was more prevalent than all of the internalising disorders.

Table 1

Frequencies and Percentages of Different Disorders

Disorder	**Frequency**	**Percentage**
Separation Anxiety Disorder (SAD)	66	21
Social Phobia (SOP)	87	28
Specific Phobia (SPP)	101	33
Panic Disorder (PD)	20	7
Agoraphobia (AGOR)	18	6
Generalized Anxiety Disorder (GAD)	120	39
Obsessive Compulsive Disorder (OCD)	75	24
Posttraumatic Stress Disorder (PTSD)	55	18
Dysthymic Disorder (DYTH)	111	36
Major Depressive Disorder (MDD)	43	14
Attention-Deficit Hyperactivity Disorder (ADHD)	262	85
Oppositional Defiant Disorder (ODD)	222	72
Conduct Disorder (CD)	141	46

Measures

Clinical diagnosis was made using the Anxiety Disorders Interview Schedule for *DSM-IV*: Parent Version (ADIS-IV:P; Silverman & Albano, 1996). The ADIS-IV:P is a semi-structured parental interview that is designed to facilitate the presence and severity of anxiety, mood and externalising disorders in children aged 6 to 18 years. During the assessment interviews, parents are asked to provide a "yes" (present) or "no" (absent) response in relation to *DSM-IV* symptoms. Subsequently,

the total number of "yes" responses is determined to obtain a total symptom scale score and to ascertain whether this total number is sufficient to meet to the number of symptoms needed to meet the *DSM-IV* criteria. The ADIS-IV:P also contains clinician severity ratings, which range from 0 to 8, to assess the severity and interference of diagnosis. The ADIS-IV:P guideline for diagnosis - that the child be provided with a diagnosis of all disorders meeting the diagnostic criteria - was followed. All diagnoses in the current study did not consider the hierarchical exclusionary rules in the *DSM-IV*. Test-retest reliability for the ADIS-IV:P over an interval of 7 to 14 days has demonstrated good to excellent reliability, with Kappa coefficients for parent interviews ranging from 0.65 to 1.00 (Silverman, Saavedra, & Pina, 2001).

The Child Behaviour Checklist (CBCL; Achenbach, 1991b), a parent report behaviour inventory, was used to evaluate the external validity of the latent classes. The CBCL is one component of the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach & Rescorla, 2001). The CBCL has demonstrated satisfactory internal consistency and 15 day test-retest reliability (Achenbach & Rescorla, 2001). Overall, the CBCL has excellent psychometric properties, which are summarised in Achenbach and Rescorla (2001) and Achenbach et al., (2008).

The CBCL provides scores for eight correlated syndromes, and includes normalized *t*-scores for two higher order 'broadband' factors, referred to as 'Internalising' factor and 'Externalising' factor. Internalising problems take the form of anxiety, depression, fearfulness and withdrawal, whereas externalising problems involve aggression, defiance, destructive behaviour and hyperactivity (Achenbach, 1991a, 1992; Campbell, 1995; Carr, 2006).

IQ was measured using the Wechsler Intelligence Scale for Children-Fourth Edition (*WISC-IV*; Wechsler, 2003). The *WISC-IV* comprises 13 subtests and has a measure of an individual's overall IQ, called Full Scale IQ (FSIQ), and also scores for Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), Processing Speed Index (PSI), and Working Memory Index (WMI). It is also possible to compute a general ability index (GAI), an overall measure of IQ that is less sensitive to the influence of working memory and processing speed (Raiford, Weiss, Rolfhus, & Coalson, 2005). The test as whole, and all the sub-tests, have excellent reliability (internal consistency and test-retest) and validity (Williams, Weiss, & Rolfhus, 2003). For the current study, the FSIQ was used to determine participants' level of intellectual functioning.

Procedure

Parental consent forms were completed prior to the assessment. Separate interviews and assessment sessions were conducted with all children and their parents over two consecutive days, with breaks provided when needed. Questionnaires and checklists were also used to obtain information from teachers. The data collected comprised a comprehensive demographic, familial, social, educational, medical, and psychological assessment of the child and his or her family. All psychological data were collected by research assistants, who were advanced doctoral students in clinical psychology or child psychiatry, and under the supervision of registered clinical psychologists or child and adolescent psychiatrists. Prior to the collection of data, the research assistants received thorough supervised practical training by the psychologists or child and adolescent psychiatrists. As part of the training for the ADIS-IV:P, the psychologists and child and adolescent psychiatrists observed research assistants administering the assessment.

Commencement of administration of the ADIS-IV:P took place once the research assistants attained competence in its administration, as assessed by the registered clinical psychologists or child and adolescent psychiatrists. Inter-rater reliability for the diagnoses made between the research assistants, and between the research assistants and their supervisors, was adequate, with kappa values generally more than .88.

All measures were administered using standardised procedures. Where it was deemed necessary, researchers read the items to participants who then completed their responses. Approximately 95% of the parent ADISC-IV interviews involved mothers only, and the rest involved fathers only or both fathers and mothers together. Clinical diagnosis was determined by two consultant child and adolescent psychiatrists who independently reviewed these data. The inter-rater reliability for diagnoses of the two psychiatrists was high for both the parent and child versions (kappa = .90).

Statistical analysis

Mplus Version 6.2 (Muthén & Muthén, 2010) was used to conduct the LCA. As all the internalising and externalising disorders were regressed on age and sex, the LCA controlled for the effects of these variables. The number of latent classes was determined using the following procedure: commencing with a single latent class, additional classes were added consecutively, until a latent class model was established that met the optimum selection criteria. The ideal number of classes was ascertained using the Bayesian Information Criteria (BIC; Schwartz, 1978), the sample-size adjusted BIC (ABIC; Sclove, 1987), the Lo-Mendell-Rubin likelihood ratio test (LRT; Lo, Mendell, & Rubin, 2001) and the Adjusted LRT (ALRT). A better model is indicated by lower BIC and ABIC values.

The LRT and ALRT test a model with *K* classes compared with a model with *K*-1 classes. A significant *p*-value shows that the model with *K* classes is an improvement over the model with *K*-1 classes. Typically, a non-significant *p*-value signifies that the model with *K* classes is not an improvement over the model with *K*-1 classes. Generally, entropy is not endorsed to indicate the model with the best number of classes (Lubke & Muthén, 2005). However, it is beneficial to include the entropy value as it supplies a summary of classification accuracy, that is, whether participants are classified neatly into one, and only one, category. Entropy lies between zero and one, with values closer to one suggesting fewer classification errors.

In relation to the current study, the external validity of the classes revealed by the LCA was determined by conducting a logistic regression analysis to evaluate how well the classes identified by the LCA correlated with the internalising and externalising factor scores on the CBCL. The regression analysis was also used to determine whether sex and age predicted class membership.

Results

Identification of the optimum number of classes

Table 2 provides the BIC, ABIC, LRT, ALRT and entropy for 1- 2- and 3-class LCA solutions. As shown, the ABIC decreased from the 1- to 2- to 3-class models. The 2-class LCA BIC value was less than the 3-class LCA model. Also, the LCA BIC value for the 3- class model increased from the 2-class model. In addition, the LRT and ALRT values for the 1- and 2- class LCA solutions were significant,

whereas these values were not significant for the 3-class LCA solution. Taken together, these findings indicate the 2-class solution fitted the data best.

In the 2-class model, classes 1 and 2 consisted of 33% (N = 102) and 67% (N = 208) of the sample, respectively. In all, 100% of the children showed various patterns of multiple disorder co-occurrence. The overall classification accuracy (entropy) for this model was 0.75 and the percentages of individuals correctly classified were 91.1% for class 1, and 93.6% for class 2.

Table 2

Fit Statistics of the Latent Class Analyses for 1, 2, and 3 Classes of Internalising and Externalising Disorders

Model	*BIC*	*Adjusted BIC*	*LRT* *p* value	*Adjusted LRT* *p* value	Entropy
1-class	4205.69	4164.45	-	-	-
2-class	3998.21	3906.23	0.0001	0.0001	0.750
3-class	4104.02	3871.30	0.694	0.696	0.857

Note. BIC = Bayesian information criterion; LRT = Lo-Mendell-Rubin likelihood ratio test

Composition of the two classes

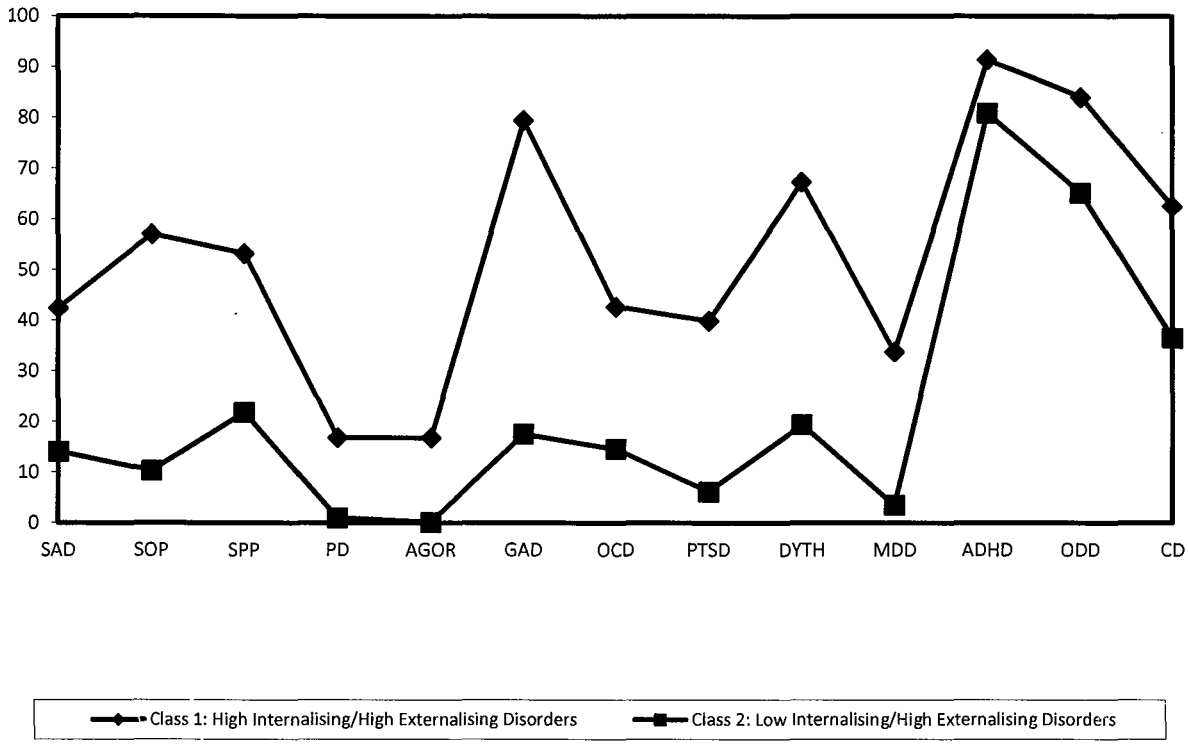
Table 3 displays the proportions of individuals with the different diagnoses in the 2-class LCA model. Figure 1 portrays the classes graphically. As will be noticed, individuals in class 1 had relatively high probabilities for all of the disorders. Individuals in class 2 had relatively higher probabilities for ADHD, ODD and CD compared to the other disorders and low probabilities for the internalising disorders.

Thus, class 1 can be considered a High Internalising/High Externalising Disorders Class and class 2 can be considered a Low Internalising/High Externalising Disorders Class.

Table 3

Proportion of Individuals with the Internalising and Externalising Disorders for the 2-Class Latent Class Analysis Model

Disorder	Class 1	Class 2
Separation Anxiety Disorder	42.4	10.3
Social Phobia	57.0	13.0
Specific Phobia	53.2	21.8
Panic Disorder	16.8	1.0
Agoraphobia	16.8	0.1
Generalized Anxiety Disorder	79.4	17.5
Obsessive Compulsive Disorder	42.7	14.6
Posttraumatic Stress Disorder	39.9	6.2
Dysthymic Disorder	67.3	19.4
Major Depressive Disorder	33.8	3.5
Attention-Deficit Hyperactivity Disorder	91.4	80.9
Oppositional Defiant Disorder	84.0	65.2
Conduct Disorder	62.6	36.6



Note. SAD = Separation Anxiety Disorder; SOP = Social Phobia; SPP = Specific Phobia; PD = Panic Disorder; AGOR = Agoraphobia; GAD = Generalized Anxiety Disorder; OCD = Obsessive Compulsive Disorder; PTSD = posttraumatic stress disorder; DYTH = Dysthymia; MDD = Major Depressive Disorder; ADHD = Attention-Deficit Hyperactivity Disorder; ODD = Oppositional Defiant Disorder; CD = Conduct Disorder.

Figure 1. Percentages of individuals in the optimum LCA 2-class model.

IQ difference between the two classes

An independent *t*-test was conducted to determine whether there was a significant difference in average IQ between the two classes. The results showed that there was no significant difference in IQ between class 1 ($M = 69.04$, $SD = 8.62$) and class 2 ($M = 69.77$, $SD = 8.74$), $t\ (308) = -.70$, $p = .49$, 95% *CI* (-2.80, 1.33).

Associations of Age, Sex, Internalising and Externalising with Latent Classes

Table 4 shows the logistic coefficients for age, sex, internalising and externalising, with the Low Internalising/High Externalising Disorders Class as the reference class. These logistic coefficients represent the log odds of being in the non-reference class versus being in the reference class. As shown in Table 4, the coefficients for age and internalising were significant and positive. These findings indicate that compared to the Low Internalising/High Externalising Disorders Class, the High Internalising/High Disorders Class was relatively more common among older children and was more strongly associated with the internalising factor on the CBCL. Both classes were not associated the externalising factor of the CBCL.

Table 4

Logistic Coefficients for Sex, Age, Internalising and Externalising on High Internalising/High Externalising Disorders Class, with Low Internalising/High Externalising Disorders Class as the Reference Group

Predictors	**Coefficients**	***p*-value**
Sex	0.38	0.43
Age	0.20	0.02
Internalising	0.18	0.00
Externalising	0.05	0.22

Discussion

The current study used latent class analysis (LCA) to examine the comorbidity of the internalising and externalising disorders in a sample of clinic-referred children with low IQ. The LCA identified two classes. Class 1 represents high internalising, high externalising disorders. Class 2 represents low internalising, high externalising disorders.

Three hypotheses were proposed. Firstly, LCA will identify a class with high probabilities of all the internalising and externalising disorders. Secondly, LCA will identify a class with relatively higher probabilities for the externalising disorders compared to the internalising disorders. Thirdly, individuals with high levels of comorbidity will have a significantly lower IQ than individuals with low levels of comorbidity. The results of the LCA supported the first two hypotheses, but did not support the third hypothesis. The findings indicated external validity for these groups. Compared to the Low Internalising/High Externalising Disorders Class, the High Internalising/High Externalising Disorders Class was more likely to be older and was more strongly associated with the internalising factor on the Child Behaviour Checklist (CBCL). An association with the externalising factor was not found. However, this result is not unexpected, given that both classes indicated high levels of comorbidity for the externalising disorders, with probabilities for the externalising disorders for both the classes yielding similar scores. In other words, because there was little difference between the two classes in terms of probabilities for the externalising disorders, neither of the two classes had a stronger association with the externalising factor on the CBCL.

Comorbidity across the externalising and externalising disorders.

The results of the analysis revealed high probabilities for the internalising and externalising disorders in Class 1, in particular for GAD (79.4%), DYTH (67.3%), ADHD (91.4%), ODD (84.0%) and CD (62.6%). In terms of heterotypic comorbidity, 75.5% of individuals had both GAD and ADHD diagnoses in Class 1, whereas 13.9% of individuals had GAD and ADHD diagnoses in Class 2. Given the evidence for heterotypic comorbidity in the general literature (e.g., Bird et al., 1993; Döpfner et al., 2009) and in the small number of intellectual disability studies that have been conducted, this finding is not unexpected. For example, Dekker and Koot (2003a) investigated comorbidity of anxiety, mood and disruptive disorders among children with low IQ and found comorbidity of multiple disorders in 14.1% of the sample overall, with comorbidity across different diagnostic groups in approximately 10% of children in the sample.

Comorbidity within the internalising and externalising disorders

The LCA in the current study revealed high probabilities for the externalising disorders in Class 1: ADHD (91.4%), ODD (84.0%), CD (62.6%) and Class 2: ADHD (80.9%), ODD (65.2%), CD (36.6%). In terms of comorbidity, 76.5% of individuals in Class 1 and 57.7% of individuals in Class 2 had diagnoses of both ADHD and ODD. The high comorbidity within the externalising disorders mirrors findings in several studies of children with normal IQ (e.g., Angold et al., 1999; Jensen, Martin, & Cantwell, 1997; Nock, Kazdin, Hiripi, & Kessler, 2007) and children with low IQ (e.g., Dekker & Koot, 2003a; Hastings et al., 2005; Kuntsi et al., 2004; Simonoff et al., 2007; Strømme & Diseth, 2000). Therefore, the finding that comorbidity within the externalising disorders was high, is not unexpected.

Implications of the study for clinical practice

The population of children and adolescents with low IQ encompasses a heterogeneous group of individuals with a broad spectrum of psychiatric comorbidity. The two latent classes revealed in the current study means that most clinic-referred children with low IQ will meet the criteria for ADHD, ODD and/or CD diagnoses. In addition, the findings suggest that a smaller, yet substantial, proportion of children with low IQ will qualify for a range of comorbid internalising and externalising disorders. The high rates of comorbidity observed in the current study are consistent with the results of previous epidemiological and comorbidity research. The findings of the current study have important implications for the quality of life and well-being of children with low IQ and their families (Hatton & Emerson, 2003), and subsequently for clinical practice within the domain of poor intellectual functioning. As a result, it is essential that clinicians consider the presence of multiple diagnoses across the internalising and externalising disorders when evaluating and assessing children with low IQ and when planning subsequent interventions.

There are few studies examining treatments for comorbidity of multiple disorders in children with intellectual disability. This limitation is a reflection on the paucity of studies identifying psychiatric comorbidity in children with low IQ. The limitation means that transdiagnostic treatment protocols for children with low IQ with co-occurring multiple disorders have not been comprehensively developed. This is particularly relevant for children with heterotypic comorbidity; those who fit the profile of class 1 (High internalising/High Externalising Disorders Class). In order to be more effective, transdiagnostic treatment interventions may have to address all, or most of the disorders within each set, rather than focus on individual

disorders. For example, given that research indicates that anxiety and depression may be part of the same core pathological construct (e.g., Barlow, 2002), effective treatment protocols should be based on this conceptualisation (Craske, 2012; Norton & Philipp, 2008; see Titov et al., 2011 for internet-based transdiagnostic treatment for anxiety and depression).

The current findings support previous studies showing that children with low IQ experience the full range of internalising and externalising disorders. However, diagnosis of internalising disorders, in particular, can present a challenge, given that intellectual impairment can mask the emotional disturbance (termed diagnostic overshadowing; Reiss, 1990). There are additional problems for children with low IQ who have internalising disorders compared to their normal counterparts. For example, the remission of depressive symptoms is less frequent in intellectual disability (Masi, Pfanner, & Marcheschi, 1998). In terms of treatment for children with low IQ who have comorbid internalising disorders, interventions generally utilise modifications of treatments used with individuals with normal intellectual functioning who have mood disorders, for which there is a substantial body of research. Treatment protocols include pharmacological treatments (for a review see Antochi, Stavrakaki, & Emery, 2003) and psychosocial therapies, such as cognitive behavioural therapy (e.g., Dagnan & Jahoda, 2006). Although the use of CBT for children and adults in the general population is well-established, the application of CBT to children with low IQ is more limited (Davis, Saeed, & Antonacci, 2008).

With reference to the externalising disorders, approximately 64% of the sample in the current study had comorbid ADHD and ODD diagnoses. Co-occurring ADHD and ODD has been reported in the intellectual disability literature. Dekker and Koot (2003a) examined the comorbidity between diagnostic pairs of

internalising and externalising disorders in a community-based sample of 1615 children with borderline to moderate intellectual impairment. Dekker and Koot reported that almost half of the children with ADHD also met the criteria for ODD. For children with low IQ and externalising disorders, current treatment protocols tend to include behavioural family intervention (Roberts, Mazzucchelli, Studman, & Sanders, 2006) and pharmacological treatments (e.g., Turgay, Binder, Snyder, & Fisman, 2002).

The finding in the current study that individuals in both the classes have highest probabilities for ADHD, followed by ODD, and then CD has not been examined in the low IQ literature, but is supported in the general literature. It has been suggested that ODD may be a developmental precursor of CD in children with low IQ (Angold et al., 1999), and that children may make the transition from ODD to CD when they are older.

In sum, the findings from the current study suggest that many children with low IQ will experience both internalising and externalising disorders. It is likely that this population require a specific assessment and treatment plan that addresses comorbidity across mood, anxiety, and behavioural disorders. The design of treatment plans may involve modifying and adapting existing interventions (Action, 2002). A multidisciplinary approach is essential when assisting children with low IQ and their families. This could involve a variety of professional and community caregivers, such as speech pathologists, occupational therapists, teachers, clinical psychologists, physicians, nurses and members of a child's family and community (Action, 2002; Shea, 2006).

Relationship between severity of IQ and psychopathology

The results of the LCA in the current study did not reveal a significant relationship between severity of IQ and comorbidity. Class 1 (High Internalising/High Externalising Disorders Class) is considered to contain higher levels of comorbidity than class 2 (Low Internalising/High Externalising Disorders Class). Comparison of the IQ scores of the two classes did not yield a significant difference. This finding is consistent with several others studies that have reported a weak or non-existent correlation between severity of intellectual impairment and risk of psychiatric disorders (e.g., Dekker et al., 2002; Einfeld & Tonge, 1996a, 1996b; Molteno et al., 2001; Strømme & Diseth, 2000). However, in contrast, other studies have reported evidence that supports the relationship between severity of IQ and the type of psychopathology diagnosed in children with low IQ (e.g., Borthwick-Duffy et al., 1997; Dekker et al., 2002; Molteno et al., 2001; Simonoff et al., 2007). One explanation for this finding is that severity of intellectual impairment may have a stronger correlation with the type of disorder than with the presence of disorder, or number of diagnoses per se. In other words, while the severity of intellectual impairment may not impact the presence of psychopathology, it may impact the particular type of disorder that is diagnosed (and possibly the severity of that disorder). Additional research is needed to advance understanding in this area.

Low IQ, psychopathology and age

In the current study, individuals in class 1 (High Internalising/High Externalising Disorders Class) were significantly older than individuals in class 2 (Low Internalising/High Externalising Disorders Class). Although there is a paucity of comorbidity literature in this area, the findings from the current study generally support de Ruiter et al's (2007) conclusion that children with low IQ who have

internalising symptoms tend to be older than those with externalising symptoms. Furthermore, the current study supported de Ruiter et al's (2007) other finding that across all ages, the overall scores for internalising disorders were lower than for the externalising disorders. However, the relationship is inconsistent; findings from the current study contrast those from previous research indicating an absence of relationship between age and psychopathology (e.g., Dekker & Koot, 2003b; Einfeld & Tonge, 1996b, Masi et al., 1999). As it has been proposed that it is important to consider mental age when diagnosing disorders (e.g., Hastings et al., 2004), future research could aim to replicate the current study using children's mental rather than chronological age.

DSM-IV/5

The finding in the current study regarding the high level of comorbidity between the anxiety and mood disorders is consistent with a large body of literature from the general population (e.g., Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Hunt, Issakidis, & Andrews, 2002; Krueger, 1999). Of relevance to this discussion is the recent publication of *DSM-5* (American Psychiatric Association, 2013), which has introduced a few significant changes to *DSM-IV*. In *DSM-IV* the anxiety and mood disorders are treated as pure categories with distinct boundaries. However, *DSM-5* groups the anxiety and mood disorders into four categories. SAD, SOP, SPP, PD, AG, and GAD are all grouped under anxiety disorders. OCD is now categorised within a new group of obsessive-compulsive and related disorders, and PTSD is considered a trauma- and stressor-related disorder. There have also been changes to the categorisation of the depressive disorders; MDD and DYTH are both classified as persistent depressive disorders. There have been minor changes in relation to the externalising disorders; ADHD is now considered a

neurodevelopmental disorder, whereas ODD and CD are classed as disruptive impulse-control and conduct disorders.

As a result of the high levels of comorbidity across the anxiety and mood disorders, commentators have debated the need for a mixed anxiety/depression category in the *DSM (*e.g., Clark & Watson, 1991). They suggest that anxiety and mood disorders do not represent separate entities with clear boundaries (e.g., Brown & Barlow, 1992; Clark & Watson, 1991; Krueger, 1999). Commentators recommend that a possible solution would be for the *DSM* to conceptualize anxiety and depression as different syndromes of the same type of psychopathology, rather than being defined as two separate disorders (Lahey et al., 2008). It is suggested that the current study contributes further to this debate, given that high rates of comorbidity were found between the anxiety and mood disorders.

Strengths of the current study

There are a number of strengths to the current study. First, the current study provides new data on the comorbidity of psychiatric disorders in children with low IQ. Although mood and behavioural disorders have been shown in several studies to be highly prevalent in children with low IQ (e.g. Benavidez & Matson, 1993; Dosen & Gielen, 1993; Einfeld et al., 2011; Masi, 1998; Masi et al., 1999; Reynolds & Miller, 1985, Sovner & Hurley, 1983,), there is a shortage of research on the pattern of comorbidity in the low IQ population of children and adolescents. Despite Angold et al's. (1999) critique regarding the use of clinical samples, the authors concede that there is a gap in the comorbidity literature, and that interesting clinical studies are the best method for uncovering important comorbidity issues. Therefore, the results from the current study provide a novel contribution to the intellectual disability and comorbidity research, and add to the taxonomic and nosological

debate. Second, given that the current study included all of the internalising and externalising disorders in the analysis, the findings can be perceived as being comprehensive and of clinical relevance. Third, as the current study controlled for age and sex in the LCA, the findings were not confounded by these factors and therefore can be deemed as reliable. Finally, the use of reliable and well-established standardized instruments for obtaining clinical diagnoses and administered by qualified and trained personnel, provided the opportunity to assess a wide range of psychiatric disorders.

Generalisability of the findings to the general population

The analysis indicated that class 1 (High Internalising/High Externalising Disorders Class) is characterized by relatively high probabilities for several of the internalising disorders, and particularly between SOP, SPP, GAD and DYTH. The four highest probabilities overall were GAD (79.4%), DYTH (67.3%), SOP (57.0%), and SPP (53.2%). In terms of comorbidity, 29.4% of individuals in class 1 had comorbid SPP, DYTH and GAD diagnoses. High levels of comorbidity between GAD and DYTH have been reported in the general population (e.g. Angold et al., 1999; Chorpita, 2002; Lahey et al., 2008), providing some support for the applicability of the study for intellectually normal children. In addition, given that the majority of the previous evidence has come from children in the general population, rather than from clinical data, the current study provides some support for the generalisability of the findings to the general population.

Limitations of the current study

Several limitations need to be considered when interpreting the findings in the current study. First, the current study examined the latent classes of the internalising and externalising disorders at the diagnostic level. Thus, the findings

may not reflect the latent classes of the internalising and externalising disorders at the symptom level. Seeley, Kosty, Farmer, and Lewinsohn, (2011) pointed out that by analysing categorical disorders, the dimensional nature of the individual disorders is disregarded and, therefore, relationships between symptoms might reveal different patterns when compared to the relationships between diagnostic categories. In addition, previous studies have demonstrated generalisability across clinical and community samples when using syndromes (e.g., McConaughy & Achenbach, 1994; Wadsworth et al., 2001). Second, all the participants were from the same clinic, which may present a bias for the sample examined, limiting the findings and subsequent conclusions. The examination of a clinically-referred sample may represent an additional bias (Berkson's bias; Berkson, 1946) and reduce the applicability of findings to comorbidity of the internalising and externalising disorders in the general community. Berkson's bias refers to the higher rates of comorbidity in clinical samples when compared to non-clinical or general population samples. The use of clinic-referred samples per se has been strongly debated in the comorbidity literature (e.g., Achenbach, 1991a; Angold et al., 1999; Caron & Rutter, 1991a; Garnefski & Diekstra, 1997; Verhulst & van der Ende, 1993). Third, as the current study was a cross-sectional design, the findings provide only a static, correlational view of the latent classes and do not consider changes in comorbidity across time. Fourth, there is possibly additional bias in this sample, since there were more than twice as many DYTH than MDD diagnoses. This leads to the consideration that there may be other, similar biases within the sample. For example, 85% of the sample had an ADHD diagnosis and 72% had a diagnosis of ODD. One explanation for the high rate of externalising disorders could be due to the higher rates of ADHD referrals to the ACPU, or it could be a result of the increased

difficulties in diagnosing internalising disorders in children with low IQ. Fifth, the IQ and age of the participants in the current study covered a broad range, which may have generated bias in the results. It is suggested that future studies examine comorbidity of individuals with low IQ within narrower IQ and age ranges.

There is a need for future studies to take account of these limitations. For example, it is suggested that studies examine the intellectually disabled community population, rather than clinical samples, or utilise a longitudinal design in order to provide insight into the onset, progress, and changes in the class types and patterns of comorbidity across time. It may be useful for future studies to examine comorbidity in a population with a narrower IQ range. Finally, the current study did not examine why children with low IQ are at increased risk of comorbid psychiatric disorders. It would be beneficial for future studies to examine the aetiology for the high rates of comorbidity in children with low IQ. Expansion of the comorbidity literature will contribute to the development of public health interventions that attend to comorbidity and address the particular needs of children with low IQ.

In conclusion, this study was the first to examine patterns of comorbidity of the internalising and externalising disorders in a clinic-referred sample of children with low IQ. New evidence for homotypic and heterotypic comorbidity in children with low IQ was found, adding to the current taxonomic debate regarding the classification of psychiatric disorders. Given the limitations in the intellectual disability literature, the current findings provide overall support for previous studies of general and low IQ populations in terms of the prevalence and comorbidity of psychiatric disorders in children and adolescents with low IQ.

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APPENDIX

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UTAS

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

27 August 2012

Professor Rapson Gomez
School of Psychology
Private Bag 30

Student Researcher: Sara Robinson

Sent via email

Dear Professor Gomez

Re: EXEMPTION FROM ETHICAL REVIEW
Project Title: **Evaluating comorbidity in children and adolescents with intellectual disability**

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee has considered the above application for exemption from ethical review.

From the information given at this time this project has been deemed to be exempt from ethical review on the following basis:

The project is negligible risk research, and involves the use of existing collections of data or records that contain only non-identifiable data about human beings, and therefore can be exempted under Section 5.1.22 of the NHMRC *National Statement on Ethical Conduct in Human Research (2007).*

On this basis the described activity is outside the scope of the Human Research Ethics Committee's arrangements and as such does not require review by the HREC (Tasmania) Network.

Yours sincerely

Katherine Shaw
Ethics Officer
Tasmania Social Sciences HREC